



Indiana Department of Education  
151 West Ohio Street  
Indianapolis, Indiana 46204

## **MEMORANDUM**

**TO:** State Board of Education  
**FROM:** Jeff Zaring, State Board Administrator  
**DATE:** March 30, 2010  
**SUBJECT:** Science Initiative

Following the Science Summit, the Department began work on a comprehensive Science Initiative. Dr. Jennifer Hicks will present a report.

## An Indiana Plan for K-12 Science Education Reform

### *Need*

In today's global economic climate, the ability to think critically and problem solve are more valuable than ever. In Indiana, this reality hits close to home where Indiana's Strategic Skills Initiative identified skill shortages throughout the state in critical thinking, complex problem solving, science, mathematics, reading comprehension and active (lifelong) learning. Critical thinking and active learning, skills that are central to an inquiry-based science learning environment, are preeminent in this list. Knowledge of science enables one to think critically and frame productive questions. With scientific knowledge a populace is empowered to become active participants in their community rather than merely observers. In other words, science is more than a method for getting ahead but a resource for becoming a critical thinker and engaging citizens in democracy.

### *Strategic Plan for Science Education*

Working with the National Science Resources Center, the Indiana Strategic Planning Committee for Science Education developed a draft of a plan for science education reform. This plan focuses on five areas for required for systemic science education reform.

- Curriculum - Curriculum materials are at the heart of a quality science education program. It is important to provide schools with criteria that will allow them to select and adopt curriculum that support inquiry-based science instruction.
- Professional Development - Professional development prepares teachers to introduce curriculum into the classroom and prepares administrators to provide support for teachers as they navigate this time of changes in content knowledge, pedagogy and curriculum. This support is ongoing and includes both pre-service and in-service teachers.
- Materials Support - A materials support system needs to be in place to ensure that teachers have access to the materials needed to facilitate an inquiry-based science classroom. Many of these materials, such as the research-based kits, require refurbishment after use in an efficient and timely manner.
- Administrative and Community Support - Broad community support will be vital to the success of the science program. Strong communication about the goals, appearance, and structure of inquiry-based methods is needed to garner community support. Support can take many forms such as volunteering in the classroom, sharing expertise, and legislative support.
- Assessment - Assessment of student learning including formative assessment and student communication about their knowledge is needed to monitor the progress and impact of the reform in science education. Additionally, ongoing assessment of teachers' content knowledge and evaluation of their instructional practice will be necessary to move teachers from novice to proficient to expert practitioner. The efficiency of the materials support system and whether or not the program as a whole is meeting its goal will need to be evaluated.

# About the Pilot

K-8 inquiry-based science education



## Fast Facts

- Any accredited public or private school may participate in the pilot – you do not need to be a member of an Educational Service Center (ESC).
- For a school to be considered for the pilot, all grades in the school and a minimum of 80% of students must participate. All teachers instructing inquiry science with the modules should attend 5 days of professional development in July 2010. (If schools adopt, there will be an additional 5 days next summer.) Building principals will need to attend two days of administrator training and participate with their teachers for three days during the summer and attend administrator specific training during the school year.
- Pilot participants will need to use the 2 modules (1 semester of material) we recommend and use assessments during the pilot to measure results. Modules are designed to last 8-10 weeks.
- We are working so that teachers may earn a stipend or graduate / continuing education credits upon completion of the training and implementation of the curriculum in their classroom.
- Schools that have already adopted inquiry-based science may participate in the pilot by using our 2 recommended modules – this can be combined with modules already in use.

## Frequently Asked Questions

- 1. What is the current state of student achievement in science and how do we measure that in Indiana?**
  - Student achievement in science is measured by ISTEP+ at the end of 4th and the end of 6th grade and then at the end of Biology I in high school. The 4th grade assessment has been in place since 2003 and the 6th grade assessment has been in place since 2005 (prior to 2009 the 4th grade ISTEP+ was given at the beginning of 5th grade and the 6th grade ISTEP+ was given at the beginning of 7th grade). During that time, in general science achievement has remained flat with an average % passing of 63% for grade 4 and 55% for grade 6 for all demographics.
- 2. Is there evidence that this initiative will improve science, math and literacy scores?**
  - Yes. We are working with national experts using a model that has been successful in school districts and in other states.
- 3. If schools want to participate in the pilot, what is their commitment?**
  - There will be a Memorandum of Understanding (MOU) between the school district, Department of Education, regional ESC, I-STEM, and institutions of higher education. Teachers and administration must attend professional development. Schools must use the recommended curriculum and assessments.
- 4. How will we measure the success of the research-developed curricular materials?**
  - We will use Indiana's student growth model, attendance rates, formative and summative assessments (I-STEP+, publisher end of course review, etc.) to evaluate the program's success.
- 5. What are the responsibilities of principals and school leaders?**
  - Principals will need to complete professional development prior to their school receiving the curricular materials. It is imperative that all school leaders support the initiative and understand the implementation of research-developed science instruction.
- 6. Will teachers receive stipends for training?**
  - This is dependent on grant funding, corporate donations, Title II money and other factors.

**7. How much will the materials cost?**

- Our long-term objective is to provide research-developed inquiry science materials for a price comparable to current textbook fees through sharing materials and large-scale refurbishment. We are working with publishers so there will be little or no cost for materials during the pilot phase.
- We estimate that the cost will be approximately \$20 / student / year for curricular materials and refurbishment after science adoption.

**8. How will professional development be funded?**

- We plan to use a variety of funding options. Schools with Title I funding can opt to use this funding by aligning their school improvement plans with improving performance in science, math and reading. Title IIa funding can be used to fund professional development focused on improving teacher quality and/or helping to provide an equitable distribution of highly qualified teachers. We are also seeking funding from corporations, foundations, grants, etc.

**9. When will professional development occur?**

- Professional development for the pilot will take place in July in each region.
- Long-term professional development will include intensive summer training, school-year workshops and just-in-time resources.

**10. Who will lead training?**

- Leaders will include Indiana experts who have completed standardized training and when necessary, experts from the curricular material publishing companies.

**11. Will there be lead teachers in the school?**

- After the pilot year, training will be provided for school teacher leaders.

**12. Will there be specialists / additional resources to help in the classroom?**

- After the pilot year, we will work with institutions of higher education as well as practicing scientists to provide specialists who will support teachers on a regular basis. It is also possible that a district would opt to use Title I or Title IIa funds to hire a district specialist.

**13. Will the newly revised science standards be affected by work on science standards at the federal level?**

- The National Academy of Sciences is working on a conceptual framework of core ideas in science that will be completed in October. We have aligned our newly revised science standards with NAEP, which they are using as a guiding document. We incorporated feedback from the College Board Standards for College Success. We do not foresee major changes that will affect implementation of science curriculum.

**14. Will science textbook adoption process be affected by work on science standards at the federal level?**

- No. The work on the conceptual framework for science will not be completed for two years and we will go forward with our science adoption as planned.

**15. Will a school have enough money to fund the adoption of research-developed curricular materials during the first year even though they don't have 6 years of textbook money?**

- Yes. This will work similar to the current process with textbook fees. Money will be paid back over the 6-year period.

**16. How will the curricular material rotation work with quarterly Acuity testing?**

- Acuity testing can be tailored to the content of your curriculum as you are teaching. If districts have any problems using this feature they can contact the Office of Student Assessment at the Indiana Department of Education ([chopkins@doe.in.gov](mailto:chopkins@doe.in.gov)).

To learn more about how you can become an advocate, visit [www.indianascience.org](http://www.indianascience.org) or contact Teresa Morris at I-STEM Resource Network, [morrist@istemnetwork.org](mailto:morrist@istemnetwork.org), (765) 494-8093 Direct Line, (765) 494-2757 Main Office



## Why is Change Needed?

In today's global economic climate, the ability to think critically and problem solve are more valuable than ever. In Indiana, this reality hits close to home where Indiana's Strategic Skills Initiative identified shortages throughout the state in critical thinking, complex problem solving, science, mathematics, reading comprehension and active (lifelong) learning. Critical thinking and active learning, skills that are central to an inquiry-based science learning environment, are preeminent to this list. Knowledge of science enables one to think critically and frame productive questions. With scientific knowledge a populace is empowered to become more active participants in their community rather than merely observers. In other words, science is more than a method for getting ahead but a resource for becoming a critical thinker and engaging citizens in democracy.

## Why Should I Care?

Science education reform for grades K-12 is a critical issue for Indiana; one that directly affects our community and economy. Continuing flat scores on our student's achievement tests in science are a cause for concern as we compete in a tough global economy and as we work to maintain the 500,000 skilled jobs in the life sciences and healthcare sector in Indiana.

We have work to do and it will require a collaborative effort from many key stakeholders – philanthropic organizations, corporations, business owners, teachers, administrators, parents, government officials and students. The effort to improve science education will improve our community, our schools, our economy and our future. When students are empowered to succeed in science the entire community feels the impact through a stronger workforce, a more robust economy, a more educated community, and an overall better quality of life.

## What is the Plan?

In working with the National Science Resource Center (NSRC), Indiana Life Science partners have formed **the Indiana Strategic Planning Committee for Science Education** and have developed a plan for science education reform. The model is based on research supporting the benefits of inquiry-based instruction, which allows students to explore and problem solve to develop deep knowledge and understanding of concepts, not just in science but every academic subject. In the classroom, students are engaged and excited as they work on science explorations independently and in collaboration with their peers. **Figure 1** represents the five areas of the reform plan that are being introduced to school districts in your region.

In February 2010, a summit was held at Eli Lilly and Company to kick off the reform effort in Indiana and to introduce Indiana's plan for implementation in school districts across the state. Regional meetings have taken place and committees have formed to establish the pilot program in their school districts. Each region is reaching out to their stakeholders to become advocates for the reform. It is important to engage all areas of the spectrum so that the plan is successful in all regions.

Indiana's Science Education Strategic Plan partners include: Indiana Department of Education (I-DOE), Indiana Science Technology Engineering Mathematics (I-STEM) Resource Network, BioCrossroads and Eli Lilly and Company. To join in the effort and to learn more about how you can become an advocate, visit [www.indianascience.org](http://www.indianascience.org).

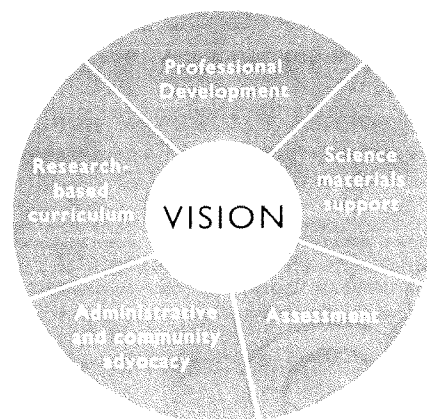


Figure 1: NSRC model of the five areas required for systemic science education reform.